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Neighborhood Poverty, College Attendance, and Diverging Profiles of Substance Use and Allostatic Load in Rural African American Youth

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Abstract

A subset of African American youth who live in impoverished neighborhoods display resilient profiles academically and behaviorally. We hypothesized that this resilience might be “skin-deep,” in that the ongoing efforts needed to achieve success might take a physiological toll on these youth. At age 19, 452 rural African American youth were assessed on broader contextual risk (neighborhood poverty) and external indicators of success (college attendance). One year later, participants were assessed on substance use and cumulative physiological risk (allostatic load). African American youth from more disadvantaged neighborhoods who attended college had lower levels of substance use, but higher levels of allostatic load compared to those from less disadvantaged neighborhoods who attended college, or to those who did not attend college. These findings indicate that a subset of African American youth from poor neighborhoods exhibits a profile of “skin-deep resilience,” characterized by external successes combined with heightened internal physiological risk.

Keywords

substance use; allostatic load; poverty; education

Individuals who grow up in impoverished neighborhoods are at greater risk for a variety of poor mental and physical health outcomes in life, including an increased risk of depression, substance abuse, and cardiovascular disease (Boardman et al., 2001; Cutrona et al., 2006; Diez-Roux et al., 2001). Nonetheless, a significant number of individuals who experience adversities such as poverty go on to achieve positive outcomes in life, a phenomenon labeled

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resilience (Masten & Coatsworth, 1998). In youth, this resilience literature has primarily focused on psychological adaptation, demonstrating how resilient youth confronting adversity exhibit numerous positive academic, behavioral, and social outcomes (Luthar, 2006; Masten & Obradovic, 2006; Rutter, 2000).

In order to succeed under contexts of high neighborhood poverty, resilient youth need to develop high levels of self-regulation, control, and competence (Brody et al., 2012; Masten, 2004; Masten, 2007). These traits enable these youth to avoid risky behaviors common in high poverty neighborhoods, such as substance use, delinquent behaviors, and school failure (Blair & Diamond, 2008; Brody & Ge, 2001; Moffitt et al., 2011; Wills et al., 2000; Wills et al., 2002; Wills et al., 2006; Wills et al., 2011). At the same time, however, ongoing efforts to resist pressures to engage in risky behaviors may take an internal, physiological toll over time, particularly for African American youth from poor neighborhoods. That is, there may be a physiological cost to maintaining the high levels of self-regulation needed to succeed in the face of persistent life adversity, resulting in resilience that is only “skin-deep” (Brody et al., 2013).

A number of researchers have argued that resilience is multi-dimensional (Luthar et al., 2000; Wright & Masten, 2005), and that resilience in one domain does not necessarily assure resilience in another domain. We argue that this disconnect may be particularly evident when contrasting academic success, risky behaviors, and physical health among disadvantaged African American youth, similar to disconnects between mental and physical health among African Americans (Jackson et al., 2010).

To achieve social mobility in the United States, low SES youth must confront and overcome multiple obstacles. They need to exhibit high levels of single-mindedness to push through barriers to educational and occupational success. At the same time, these youth must exhibit high levels of self-regulation, steering clear of risky behaviors that can jeopardize future prospects. While these strategies are beneficial in the academic realm, they may come at a cost to physical health. In fact, we have argued that low SES youth are most likely to maintain good health when they adopt a very different set of strategies, called “shift-and-persist.” According to this view, low SES youth repeatedly face uncontrollable life stressors, which typically cannot be managed through the kinds of active-coping efforts that facilitate academic success. Instead, we argue that for low SES youth, coping efforts that involve acceptance and accommodation of the self to the stressor (e.g., through cognitive reappraisals), combined with endurance of adversity with strength by finding meaning in difficult situations and maintaining optimism will be most beneficial physiologically (Chen et al., 2012; Chen & Miller, 2012).

In a previous study we demonstrated this phenomenon of “skin-deep resilience,” finding that rural African American preadolescents who came from low SES families but who were reported by teachers to have high psychosocial competence (at age 11) displayed low levels of depression and externalizing behaviors years later, but at the same time, exhibited high levels of physiological risk (allostatic load) (Brody et al., 2013). These patterns are also consistent with John Henryism theory, in which high effort coping, characterized by efficacious mental and physical vigor, a strong commitment to hard work, and a single-

Method

Sample

We tested our hypotheses using data from the longitudinal Strong African American Families Healthy Adult Panel (SHAPE) study. African American primary caregivers and a target youth selected from each family participated in annual data collections; youths' mean age was 11.2 years at the first assessment and 20.4 years at the last assessment. Of the youths in the sample, 53% were female. At baseline, 78% of the caregivers had completed high school or earned a general equivalency diploma. The families resided in nine rural counties in Georgia, in small towns and communities in which poverty rates are among the highest in the nation and unemployment rates are above the national average (Proctor & Dalaker, 2003). At the first assessment, although the primary caregivers in the sample worked an average of 39.4 hours per week, 46.3% lived below federal poverty standards, with a median family income of \$1,655 per month. At the last assessment, the proportion was 49.1% with a median income of \$1,169. The increase in the proportion of families living in poverty and the decrease in family income over time may have resulted from the economic recession that was occurring during 2010, when the last wave of data was collected.

At the first assessment, 667 families were selected randomly from lists of fifth-grade students that schools provided (see Brody, Murry, et al., 2004, for a full description). From a sample of 561 at the age 19 data collection (a retention rate of 84%), 500 emerging adults were selected randomly to participate in the assessment of allostatic load; of this subsample, 489 agreed to participate. Of these 489 participants, data were successfully collected from 479 (98%) at age 20. The current study was based upon the 452 participants (202 men and 250 women; 94% of those from whom data were collected at age 20) nested within 91 census tracts who agreed to participate in the assessment of allostatic load and who provided data on all measures in the age 19 and age 20 data collections.

With respect to differences between the present study and our previous work (Brody et al., 2013), although the sample is drawn from the same longitudinal study, in our previous paper, we focused on early adolescent indicators at age 11 of skin-deep resilience (family risk characterized by low socioeconomic status, and external success as indicated by teacher ratings of student competence), whereas in the present study, we focused on late adolescent indicators at age 19 of resilience (risk characterized from the broader social environment by neighborhood poverty, and success as indicated by making it to college).

Procedures

Informed consent was obtained at each data collection wave. Youths age 18 and older consented to their own participation. Participants were told that the purpose of the study was to identify predictors of health and well-being among rural African American adolescents. At age 19, self-report data were collected in participants' homes by two African American field researchers using a standardized protocol. Interviews were conducted privately, with no other family members present or able to overhear the conversation. Neighborhood characteristics were quantified using the United States Census Bureau's (2010) 2006–2010

American Community Survey data. Allostatic load and substance use were measured when the target youth were 20 years of age. Youth were compensated \$100 at each wave of data collection. This study was approved by the University of Georgia IRB.

Measures

Neighborhood poverty—The measure of neighborhood poverty (percentage of residents in a neighborhood living below poverty) was created using the United States Census Bureau's American Community Survey. This nationwide survey is taken every year to collect data about the demographic, social, economic, and housing characteristics of the American population (United States Census Bureau, 2013). The data are available as 1-year, 3-year, and 5-year compilations. For this study, the 2006–2010 5-year estimates (United States Census Bureau, 2010) were used to quantify neighborhood characteristics in 2009, when the participants were 19. The economic and housing data were used to determine the percentage of residents in participants' neighborhoods ($N = 91$) whose income fell below the federal poverty level ($M = .25$, $SD = .10$).

College attendance—At age 19, youths reported whether they were currently enrolled in high school, a vocational school, job corps, a 2-year college, a 4-year college or university, or not enrolled in any school. Education status was scored dichotomously, *1* if respondents were enrolled in a 2-year college or a 4-year college or university, and *0* for respondents not enrolled in postsecondary education. In this sample, 38.9% of the participants were enrolled in college.

Substance use—Participants reported their past-month cigarette smoking, alcohol use, heavy drinking, and marijuana use (Brody et al., 2009). The items regarding past-month substance use were, "During the past month, how many times have you: smoked cigarettes; drunk beer, wine, wine coolers, whiskey, gin, or other liquor; had three or more drinks of alcohol at one time; smoked marijuana?" These four items were rated on a 6-point scale ranging from 0 to 12 times or more; responses were summed to form a past-month substance use index (Mean = 1.801, $SD = 2.776$). We used the composite score in the analyses for substance use involvement; this procedure is consistent with prior research (Brody et al., 2009; Wills, Murry, et al., 2007).

Emerging adult allostatic load—The protocol for measuring allostatic load was based on procedures developed for field studies involving children and adolescents (Evans, 2003). Resting blood pressure was monitored with Dinamap Pro 100 (Critikon; Tampa, FL) while the youth sat reading quietly. Three readings were taken every 2 minutes, and the average of the last two readings was used as the resting index. This procedure yields highly reliable indices of chronic resting blood pressure (Kamarck et al., 1992). Overnight urine samples were collected for assays of catecholamines and cortisol. Beginning on the evening of data collection, all urine that a youth voided from 8 p.m. to 8 a.m. was stored on ice in a container with metabisulfite as a preservative. Total volume was recorded, and four 10-ml samples were randomly extracted and deep frozen at -80°C until urine collection was completed. The pH of two of these samples was adjusted to 3 to inhibit oxidation of catecholamines. The frozen urine was delivered to the Emory University Hospital medical

laboratory in Atlanta, Georgia, for assaying. Total unbound cortisol was measured with a radioimmune assay (Contreras, Hane, & Tyrrell, 1986). Epinephrine and norepinephrine were assayed with high-pressure liquid chromatography with electrochemical detection (Riggin & Kissinger, 1977). Creatinine was assayed to control for differences in body size and incomplete urine voiding (Tietz, 1976). Technicians blind to the participants' risk status assayed the samples.

Allostatic load was calculated by summing the standardized scores of six indicators: overnight cortisol, epinephrine, and norepinephrine; resting diastolic and systolic blood pressure; and body mass index (weight in kilograms divided by the square of height in meters). The approach of standardizing and summing scores to calculate allostatic load is a standard approach in the literature, with sum totals across systems indicative of cumulative biological dysregulation and predicting cardiovascular and mortality outcomes better than individual scores (Seeman et al., 1997; Seeman et al., 2001; Seeman et al., 2010). Prior studies of allostatic load in adults (Seeman et al., 2001), children (Evans, 2003), and adolescents (Brody et al., 2013b) used similar metrics, combining multiple physiological indicators of risk into a total allostatic load index. The mean of the allostatic load composite was $-.044$ ($SD = 3.196$).

Covariates—We controlled for a number of potential alternative explanations for study findings. These included demographic variables including gender; neighborhood ethnic composition (the percentage of African American residents in respondents' census tracts); and cumulative family socioeconomic risk. Cumulative family socioeconomic risk was defined as the sum of six family socioeconomic risk indicators: family poverty as assessed using United States government criteria (an income-to-needs ratio ≥ 1.5), primary caregiver noncompletion of high school or an equivalent, primary caregiver unemployment, single-parent family structure, family receipt of Temporary Assistance for Needy Families, and income rated by the primary caregiver as less than adequate to meet all needs. Also included as covariates were factors potentially related to participants' college experiences. These included: whether participants' primary caregivers had attended college; whether participants currently lived with their family; how many hours participants were employed for; financial stress (the extent to which respondents were unable to afford the basic necessities of life, such as food and clothing. This is a four item measure, with each item answered on a 4 point scale; Conger & Elder, 1994); and perceived discrimination (a version of the Schedule of Racist Events adapted for adolescents; Brody et al., 2006; Landrine & Klonoff, 1996. This measure assesses the frequency of a list of 9 specific discriminatory events in the past year, with each item rated on a 3 point scale).

Plan of Analysis

The data's hierarchically nested structure (individual participants nested within 91 neighborhoods) presented an important data analytic challenge because participants could be influenced by common neighborhood environments. The resulting potential nonindependence is not controlled in traditional regression models. To avoid this problem, we used a complex sampling design model available in the Mplus 7 statistical software (TYPE=COMPLEX function; Muthén & Muthén, 2012; MacKinnon, 2007). This model

produced sandwich standard errors of the estimated coefficients that were adjusted for 91 census tracts; this reduced Type 1 error inflation due to neighborhood clustering. This model was applied to the OLS regression model used to analyze the allostatic load data, and a zero-inflated negative binomial regression model was used to analyze substance use data because of the distribution of response for substance use questions.

Results

Descriptive Statistics

About 29% of the participants lived in neighborhoods in which more than 30% of households fell below federal poverty standards. Of the study participants, 39.4% were enrolled in college at age 19. When the participants were 20 years old, past-month substance use rates were 20% for cigarette smoking, 49% for alcohol use, 17% for heavy drinking, and 20% for marijuana use. See Table 1 for bivariate associations among study variables.

Tests of the Study Hypotheses

Substance Use—The results of the analysis for substance use are presented in Table 2, Models a and b. Model a reveals the main effect for college attendance. Youth attending college used substances less than did youth who did not attend college. This main effect was qualified by the neighborhood poverty $\times$ college attendance interaction, $b = -2.888$, 95% CI $(-5.679, -.097)$, $p = .043$, partial $R^2 = .008$. To interpret this finding, we plotted estimated levels of substance use at increasing levels of neighborhood poverty for youth who were or were not attending college. These results are presented in Figure 1. Residence in a high-poverty neighborhood was not associated with substance use for youth attending college, $b = -1.038$, 95% CI $(-2.966, .890)$, ns. In contrast, neighborhood poverty was associated with substance use among those not attending college, with the highest level of substance use found among youth who lived in high-poverty neighborhoods and were not attending college, $b = 1.849$, 95% CI $(.187, 3.512)$, $p = .029$.

To determine whether results were robust across the different types of substances, we conducted analyses with each specific substance (analyses presented in the online supplement). These analyses show that the neighborhood poverty $\times$ college attendance interaction was significant for smoking and marijuana use, but not for alcohol use (Supplemental Table 1). The online supplement also presents bivariate associations among substance use variables (Supplemental Table 2).

Allostatic load—The results of the analyses for allostatic load are presented in Table 2, Models c and d. Model c revealed no main effects; model d detected the hypothesized neighborhood poverty $\times$ college attendance interaction, $b = 8.423$, 95% CI $(2.667, 14.180)$, $p = .004$, partial $R^2 = .014$. To interpret these results, we plotted estimated levels of allostatic load at increasing levels of neighborhood poverty $\times$ college attendance. Figure 2 shows an interaction consistent with the study hypothesis: When youth lived in neighborhoods characterized by low poverty levels, college attendance was not associated with allostatic load 1 year later, whereas the effect of college attendance became stronger as neighborhood poverty increased. Or, put another way, among those not in college, neighborhood poverty

was not associated with allostatic load, $b = -2.650$, 95% CI $(-6.269, .969)$, $p = .151$. However, among those in college, coming from a neighborhood with greater poverty was associated with higher allostatic load, $b = 5.774$, 95% CI $(.826, 10.722)$, $p = .022$. Allostatic load was highest among youth who, at age 19, lived in high-poverty neighborhoods and were attending college.

Is it the same youth who manifest both low substance use and high allostatic load?—In an ancillary analysis to address this question, we created groupings of youth who either came from high neighborhood poverty ($>30\%$ of residents in the neighborhood living below poverty, $n=108$) or low neighborhood poverty ($\leq 30\%$ below poverty, $n=344$). The particular group that we are interested in are those who come from high poverty neighborhoods and who make it to college (24% of the group who went to college came from a high poverty neighborhood). This group evidenced both higher levels of allostatic load ($M=.40$, $SD=.44$, $t=2.82$, $p<.01$) as well as lower levels of substance use ($M=1.47$, $SD=1.54$, $t=1.78$, $p<.01$) compared to the group who came from high poverty neighborhoods but who did not attend college ($M=.17$, $SD=.34$ for allostatic load; $M=2.44$, $SD=3.80$ for substance use).

Are effects specific to neighborhood poverty?—We hypothesized that neighborhood social contexts become increasingly important as adolescents mature and begin to spend the majority of their time outside the home. To test the specificity of these effects, we probed whether family socioeconomic risk interacted with college attendance to predict either substance use or allostatic load. Neither effect was significant (substance use: $b = -.114$, 95% CI $(-.381, .153)$, $p = .404$, partial $R^2 = .001$; allostatic load: $b = -.011$, 95% CI $(-.652, .631)$, $p = .974$, partial $R^2 = .000$), indicating that effects in older adolescents are specific to neighborhood context risks.

Discussion

The results from this study support the hypothesis of “skin-deep resilience” in a sample of rural, African American older adolescents. African American youth who came from high-poverty neighborhoods but who made it to college showed significantly lower rates of substance use (composite of smoking, drinking, marijuana use) compared to their counterparts from high-poverty neighborhoods who did not attend college. At the same time, however, these same youth showed significantly higher levels of allostatic load compared to their counterparts who did not attend college, and compared to youth from low-poverty neighborhoods who attended college.

The finding with respect to substance use is consistent with a large previous literature documenting the links between college attendance and health-compromising behaviors. Youth who attend college are significantly less likely to use or abuse substances (drugs, cigarettes, or alcohol) than their counterparts who do not attend college (Breslau et al., 2008; Kessler et al., 1995; White et al., 2005). African-American youth who are at-risk by virtue of having grown up in disadvantaged neighborhoods show the same patterns in this study of having lower levels of substance use if they attend college. To make it out of impoverished circumstances to college takes a tremendous amount of hard work and self-regulation, and

these same skills may also allow youth to resist temptations to use substances (Wills et al., 2002; Wills et al., 2006). Thus college attendance, and the underlying characteristics of students that make it to college such as high levels of self-regulation, may serve as buffers to substance use in young adults.

This is especially important among African American youth, as rates of drug use escalate dramatically during the transition to adulthood (Watt, 2008), and African Americans who use substances experience more negative consequences given an equivalent amount of consumption as do members of other ethnic groups (Jones-Webb, 1998). This results in numerous racial disparities in drug-related outcomes in adulthood, including alcohol dependence and drug arrests (Galea & Rudenstine, 2005; Mitchell & Caudy, 2013). Thus understanding the factors that may help buffer these youth from risky behavior trajectories as they enter into adulthood is critical.

At the same time, the findings with allostatic load suggest that these youth, despite appearing to be “success stories” by external indicators, are still at risk, in this case for future health problems (as indicated by higher levels of allostatic load). Making it to college for many of these youth involves years of hard work, determination and effective self-regulation. In addition, once they are in college, African American youth who come from impoverished neighborhoods may experience additional stressors that stem from having to navigate an environment (college) that feels largely foreign to them. These stressors may include difficulties fitting in with peers who largely come from very different backgrounds, feelings of not belonging, and a lack of understanding about norms for successful college student behavior, such as how to speak up in class or how to approach professors when one is struggling in class. The burden of achieving despite these obstacles, and the self-regulation needed to be successful in the college environment, may take its toll internally. This internal toll is indicated by elevations in catecholamines, cortisol, blood pressure, and obesity – the composite of allostatic load that when taken together, predicts risk for cardiovascular diseases and all-cause mortality later in life (Seeman et al., 1997; Seeman et al., 2001). We note, however, that conclusions about the implications of both patterns should be qualified by the fact that the incremental variance accounted for by the neighborhood poverty×college attendance interaction terms were small.

These findings of “skin-deep resilience” are consistent with previous literature on the physiological consequences of John Henryism in African American adults (James et al., 1987a; James et al., 1992). These findings are also consistent with our previous study in which we demonstrated divergent patterns for mental health (depression, externalizing behaviors) versus physiological profiles among low SES African American youth who showed high levels of competence at age 11 (Brody et al., 2013). The present study extends this work to factors relevant at older developmental levels (age 19), by investigating the roles of broader neighborhood contexts and the effects of success stemming from making it to college. The findings in the present study also suggest that among older adolescents, the neighborhood social context may be more important than family circumstances for skin-deep resilience (as indicated by interactions with neighborhood poverty but not with family SES risk). These patterns are also consistent with a large literature demonstrating that there are independent and/or differential effects of family SES vs. neighborhood SES on a variety

of health outcomes (Chen & Paterson, 2006; Diez-Roux et al., 2001; Petersen et al., 2006; Petersen et al., 2008; Robert, 1998; Sloggett & Joshi, 1994).

We note that these findings postulate a somewhat different role for substance use in African Americans compared to some other research. For example, in seeking to explain why African Americans experience worse physical health compared to other groups but lower-than-expected rates of major mental disorders, Jackson suggests that African Americans may be more likely to engage in substance use as one method of coping with the multitude of daily life stressors that they experience, and that this increased use of substances diminishes stress (and reduces the likelihood of mental disorders) but then contributes to the development of chronic physical health problems later in life (Jackson et al., 2010; Mezuk et al., 2010). Jackson's theory explains *overall group differences* between American Americans and others in terms of mental and physical health outcomes. In contrast, our theory of 'skin-deep resilience' is aimed at explaining a *subgroup* of African Americans who seem on the surface to be success cases because they look positive not only in terms of good mental health, but also in terms of low levels of substance use. The focus in our theory is on the effortful self-regulation and competence needed to achieve these successes (including refraining from substance use), and the toll that this effort and determination can take physiologically.

When taken together, the patterns from this study and our previous one (Brody et al., 2013) suggest important implications for the focus of prevention programs aimed at minority youth growing up under disadvantaged circumstances. The first is in terms of an awareness that the relevant risks to minority youth may shift from predominantly family factors to also including neighborhood factors as they enter older adolescence. Second is that the relevant external indicators of success may also shift across development, from competence at school and lack of behavioral problems to college attendance and the college experience. In addition, many intervention programs target children based on difficulties on external dimensions – e.g., school struggles or early substance use (Wyman, 2003). However, the present results suggest that targeting behavioral vulnerability is not sufficient, as children who appear to be doing well overtly may actually be experiencing adverse physiological consequences of this success. Finding ways in future prevention programs to also identify and target these hidden costs of success may create additional long-term benefits in terms of physical health among at-risk populations.

One note about study patterns is that previous research has demonstrated that lower SES is associated with higher allostatic load (Seeman et al., 2004; Seeman et al., 2010), which we did not find in our sample. It may be the case that within our population, being "higher SES" (e.g., attending college) may come with additional pressures that offset the typical benefits of high SES found in other samples. In addition, we note that neighborhood poverty had small bivariate associations with other study variables, such as allostatic load, substance use, and college attendance. We are not sure of the reason for these small associations, but speculate that the nature of the sample (rural African American youth in the South) may make associations with poverty different from other studies that include a broader spectrum of racial/ethnic groups and SES.

Limitations of this study include the assumption that college attendance represents an accumulation of years of high-self regulation and effortful control among at-risk youth. We did not have direct measures of self-regulation or effortful control to be able to test key hypothesized processes, or to be able to track the effects of the long-term accumulation of these processes over time. Nor did we have direct measures of the pressures that youth were facing in the different neighborhoods, such as peer pressure to engage in substance use or to engage in delinquent behaviors. Future studies need to explicitly characterize the stressors these youth are under and the efforts that they are making along the way in order to make it to college and to be successful while in college. In addition, this study was not able to rule out other possible alternative explanations, such as academic performance, or other aspects of students' college experiences that may have contributed to the pattern of findings. Future studies that include follow-ups on the health side would be informative for understanding the clinical health implications as well as trajectories of health into adulthood related to skin-deep resilience. In addition, it is not known whether these results could generalize to other minority families or other families from impoverished neighborhoods.

In sum, the present study's findings reveal that older rural African American youth who come from impoverished neighborhoods and who make it to college show positive profiles in terms of reduced likelihood of substance use, but at the same time show riskier profiles physiologically in terms of allostatic load. These findings suggest that resilience is multi-factorial and that youth who exhibit resilience in one domain may not necessarily display resilience in other domains. Future approaches that make efforts to assess and address vulnerabilities across multiple domains may help our society to more effectively target interventions in ways that allow us to promote experiences of health and well-being more broadly construed among at-risk youth.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
The effect of neighborhood poverty on substance use by college attendance.

Figure 2.
The effect of neighborhood poverty on allostatic load by college attendance.

Table 1

Correlation matrix for the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Allostatic load	—											
2. Substance use	-.003	—										
3. Neighborhood poverty	.040	.015	—									
4. College attendance	-.078 [†]	-.123 ^{**}	-.047	—								
5. Percentage of African American residents	-.029	-.010	.426 ^{**}	.046	—							
6. SES-related risk	.042	-.049	.142 ^{**}	-.248 ^{**}	.012	—						
7. Males	.192 ^{**}	.186 ^{**}	.014	-.152 ^{**}	-.002	.002	—					
8. Number of hours employed	.029	.032	-.007	-.092 [†]	-.078 [†]	-.079 [†]	-.090 [†]	—				
9. Financial stress	-.050	.064	-.052	-.081 [†]	.026	.049	-.012	.053	—			
10. Racial discrimination	-.058	.214 ^{**}	-.085 [†]	.033	-.102 [*]	-.103 [*]	.016	.109 [*]	.122 ^{**}	—		
11. Primary caregivers college attendance	-.061	.011	-.112 [*]	.230 ^{**}	.043	-.564 ^{**}	.017	.020	-.120 [*]	.060	—	
12. Living with families	.050	.041	-.026	-.377 ^{**}	-.101 [*]	.017	.080 [†]	.096 [*]	.052	.030	-.007	—

^{**} $p < .01$;

^{*} $p < .05$;

[†] $p < .10$ (two-tailed tests); $N = 452$

Table 2
Regression Models with Complex Sampling Design Depicting the Results of Main and Moderating Effects

	Substance Use ^a				Allostatic Load ^b			
	Model a		Model b		Model c		Model d	
	b (robust SE)	Odds Ratio	b (robust SE)	Odds Ratio	b (robust SE)	Odds Ratio	b (robust SE)	β
Neighborhood poverty	.476 (.571)	1.610	1.849* (.848)	6.353	1.030 (1.652)		-2.650 (1.846)	-.076
College attendance (1 = in college)	-.462** (.151)	.630	.215 (.369)	1.240	-.432 (.359)		-2.396** (.782)	-.366
Neighborhood poverty × College attendance			-2.888* (1.424)	.056			8.423** (2.937)	.335
Control variables								
Percentage of African American residents	.023 (.357)	1.023	-.004 (.356)	.996	-.650 (.779)		-.602 (.753)	-.037
SES-related risk	-.141 [†] (.074)	.868	-.140 [†] (.078)	.869	-.127 (.152)		-.106 (.147)	-.033
Males	.514** (.132)	1.672	.495** (.130)	1.640	.923** (.274)		.949** (.274)	.148
Number of hours employed	.000 (.003)	1.000	.000 (.003)	1.000	.012 (.008)		.013 (.008)	.062
Financial stress	.022 (.026)	1.022	.020 (.027)	1.020	-.038 (.050)		-.035 (.051)	-.032
Racial discrimination	.095** (.018)	1.100	.091** (.019)	1.095	-.019 (.040)		-.009 (.041)	-.010
Primary caregivers college attendance	-.051 (.148)	.950	-.064 (.150)	.938	-.273 (.309)		-.213 (.301)	-.033
Living with families	-.122 (.150)	.885	-.080 (.146)	.923	-.106 (.286)		-.124 (.285)	-.019
Constant	.008 (.383)	1.008	-.291 (.401)	.748	.298 (.697)		1.045 (.730)	
Dispersion	1.120**		1.100**					
-2LL	1571.416		1567.672					
R ²					.233		.247	

Note:

^a A zero-inflated negative binomial regression with robust standard errors.

^b bOLS regression model with robust standard errors. SES = socioeconomic status.

N(persons) = 452 and *N*(neighborhoods) = 96.

* *p* .05, two-tailed.

** *p* .01, two-tailed.

† $p < .10$, two-tailed.

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